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=> s synthesis gas or (hydrogen (1a) carbon monoxide
UNMATCHED LEFT PARENTHESIS 'OR (HYDROGEN'
The number of right parentheses in a query must be equal to the
number of left parentheses.

=> s synthesis gas or (hydrogen (1a) carbon monoxide)
       1145286 SYNTHESIS
             3 SYNTHESISES
         62662 SYNTHESES
       1180749 SYNTHESIS
                 (SYNTHESIS OR SYNTHESISES OR SYNTHESES)
       1383408 GAS
        476155 GASES
       1554163 GAS
                 (GAS OR GASES)
         14920 SYNTHESIS GAS
                 (SYNTHESIS(W)GAS)
        839755 HYDROGEN
          5431 HYDROGENS
        842809 HYDROGEN
                 (HYDROGEN OR HYDROGENS)
       1080401 CARBON
         24057 CARBONS
       1089165 CARBON
                 (CARBON OR CARBONS)
        161813 MONOXIDE
           963 MONOXIDES
        162325 MONOXIDE
                 (MONOXIDE OR MONOXIDES)
        136820 CARBON MONOXIDE
                 (CARBON(W)MONOXIDE)
          9456 HYDROGEN (1A) CARBON MONOXIDE
L1       23333 SYNTHESIS GAS OR (HYDROGEN (1A) CARBON MONOXIDE)

=> s l1 and (fischer (1a) tropsch or hydrocarbon? (1a) synthesis)
         22010 FISCHER
            15 FISCHERS
         22022 FISCHER
                 (FISCHER OR FISCHERS)
          7130 TROPSCH
          7065 FISCHER (1A) TROPSCH
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        480295 HYDROCARBON?
       1145286 SYNTHESIS
             3 SYNTHESISES
         62662 SYNTHESES
       1180749 SYNTHESIS
                 (SYNTHESIS OR SYNTHESISES OR SYNTHESES)
          3588 HYDROCARBON? (1A) SYNTHESIS
L2         2603 L1 AND (FISCHER (1A) TROPSCH OR HYDROCARBON? (1A) SYNTHESIS)

=> s l2 and heat (1a) exchang?
       1183284 HEAT
         52576 HEATS
       1196409 HEAT
                 (HEAT OR HEATS)
        633881 EXCHANG?
         61852 HEAT (1A) EXCHANG?
L3          70 L2 AND HEAT (1A) EXCHANG?

=> s l3 and coolant
         32296 COOLANT
         13162 COOLANTS
         37468 COOLANT
                 (COOLANT OR COOLANTS)
L4           4 L3 AND COOLANT

=> s l4 and fluidized bed
         65181 FLUIDIZED
             1 FLUIDIZEDS
         65181 FLUIDIZED
                 (FLUIDIZED OR FLUIDIZEDS)
        151796 BED
         62020 BEDS
        174383 BED
                 (BED OR BEDS)
         57193 FLUIDIZED BED
                 (FLUIDIZED(W)BED)
L5           0 L4 AND FLUIDIZED BED

=> s l4 and fluidized
         65181 FLUIDIZED
             1 FLUIDIZEDS
         65181 FLUIDIZED
                 (FLUIDIZED OR FLUIDIZEDS)
L6           0 L4 AND FLUIDIZED

=> d l3 and fluidized bed
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'FLUIDIZED' IS NOT A VALID FORMAT FOR FILE 'CAPLUS'
'BED' IS NOT A VALID FORMAT FOR FILE 'CAPLUS'

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FAM --------- AN, PI and PRAI in table, plus Patent Family data
FBIB -------- AN, BIB, plus Patent FAM
IND --------- Indexing data
IPC --------- International Patent Classifications
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L8 ANSWER 1 OF 7 CAPLUS COPYRIGHT 2004 ACS on STN
ACCESSION NUMBER: 2004:430632 CAPLUS
DOCUMENT NUMBER: 140:425244
TITLE: Multistage compact **Fischer-Tropsch** reactor for the manufacture of **hydrocarbons** from **synthesis gas**
INVENTOR(S): Borsa, Alessandro G.; Vanderborgh, Nicholas E.
PATENT ASSIGNEE(S): Blue Star Sustainable Technologies Corporation, USA
SOURCE: U.S. Pat. Appl. Publ., 16 pp.
CODEN: USXXCO
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2004102530	A1	20040527	US 2002-302478	20021122
PRIORITY APPLN. INFO.:			US 2002-302478	20021122

AB A multistage compact packed-bed **Fischer-Tropsch** reactor comprises a plurality of first-stage reaction tubes and a plurality of second-stage reaction tubes in a reaction-**heat-exchange** chamber of a reactor vessel. The interior space of each of the reaction tubes contains a packed bed of catalyst. The reactor vessel contains an interstage fluid process chamber and a **heat exchanger** for condensing hydrocarbon products and water. After passing **synthesis gas** (e.g., a H2-CO mixture) through the catalyst in the first-stage reaction tubes, a process gas stream is cooled by a **heat exchanger** within the reactor vessel to condense the hydrocarbon product and water. The liquid hydrocarbons and water are removed from the reactor vessel. The product gas stream then enters the second-stage tubes in which it is preheated by transfer of heat from the first-stage reaction tubes. The reactor comprises an exit-fluid process chamber within the reactor vessel. After passing through the catalyst in the second-stage reaction tubes, the process gas stream is cooled by a second **heat exchanger** within the reactor vessel to condense hydrocarbon products and water out of the process gas stream. In the exit-fluid process chamber, liquid hydrocarbons and water are separated from the process gas stream. Process flow diagrams are presented.

L8 ANSWER 2 OF 7 CAPLUS COPYRIGHT 2004 ACS on STN
ACCESSION NUMBER: 2004:102011 CAPLUS
DOCUMENT NUMBER: 140:166416
TITLE: Renewable **Fischer-Tropsch** fuels for future powertrain concepts
AUTHOR(S): Carlowitz, O.; Claussen, M.; Maly, M.; Schindler, M.; Vogel, S.
CORPORATE SOURCE: CUTEC Institut GmbH, Clausthal-Zellerfeld, Germany
SOURCE: VDI-Berichte (2003), 1808(Kraftstoffe und Antriebe der Zukunft), 439-449
CODEN: VDIBAP; ISSN: 0083-5560
PUBLISHER: VDI Verlag GmbH
DOCUMENT TYPE: Journal
LANGUAGE: German

AB In a **fluidized bed** gasifier biomass was converted into a H2- and CO-rich **synthesis gas** by addition of O2 and water. The used biomass consisted on wood, crops, and oil seeds. The dust in the **synthesis gas** was removed by a cyclone and hot gas filters, and the cool-down of the raw gas by use of **heat exchangers** led to the separation of tar and water. Compds. containing S, N or Cl were separated by sorption, and the gas was used to synthesize hydrocarbons via the **Fischer-Tropsch** process. Mild

hydrocracking and product separation led to gasoline, kerosene, and diesel fuels, which were validated by combustion in suitable engines and anal. methods.

REFERENCE COUNT: 15 THERE ARE 15 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 3 OF 7 CAPLUS COPYRIGHT 2004 ACS on STN
ACCESSION NUMBER: 2002:927371 CAPLUS
DOCUMENT NUMBER: 138:5854
TITLE: **Fischer-Tropsch** process using a reactor with high-shear mixing for the manufacture of higher **hydrocarbons** from **synthesis gas**
INVENTOR(S): Hensman, John Richard; Newton, David
PATENT ASSIGNEE(S): BP Exploration Operating Company Limited, UK; Davy Process Technology Limited
SOURCE: PCT Int. Appl., 35 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 3
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002096835	A2	20021205	WO 2002-GB2307	20020517
WO 2002096835	A3	20030508		
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
EP 1390445	A2	20040225	EP 2002-735571	20020517
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR				
US 2004180976	A1	20040916	US 2004-476799	20040427
PRIORITY APPLN. INFO.:			GB 2001-12788 A	20010525
			GB 2001-12790 A	20010525
			WO 2002-GB2307 W	20020517

AB The conversion of **synthesis gas** into higher **hydrocarbons** by **synthesis gas**, at an elevated temperature and pressure, with a suspension of a particulate **Fischer-Tropsch** catalyst, is achieved in a system comprising at least one high-shear mixing zone and a reactor vessel where the process comprises: (a) passing the suspension and the gaseous stream through the high-shear mixing zone(s) where the gaseous stream is broken down into gas bubbles and/or irregularly shaped gas voids; (b) discharging the suspension having gas bubbles and/or irregularly shaped gas voids dispersed in it from the high-shear mixing zone(s) into the reactor vessel; and (c) maintaining the temperature of the suspension discharged into the reactor vessel at the desired reaction temperature by means of an internal **heat exchanger** positioned within the suspension in the reactor vessel characterized in that at least 5% of the exothermic heat of reaction is removed from the system by means of the internal **heat exchanger**. The remainder of the exothermic heat of reaction may be removed from the system by means of an external **heat exchanger** and/or through the introduction of a liquid **coolant**.

L8 ANSWER 4 OF 7 CAPLUS COPYRIGHT 2004 ACS on STN
ACCESSION NUMBER: 2002:189393 CAPLUS

TITLE: Compact multiple-plate reactor for exothermic catalytic processes
AUTHOR(S): Czernichowski, Mieczyslaw; Czernichowski, Albin
CORPORATE SOURCE: Etudes Chimiques et Physiques, Orleans, N/A, Fr.
SOURCE: Abstracts of Papers, 223rd ACS National Meeting, Orlando, FL, United States, April 7-11, 2002 (2002), IEC-120. American Chemical Society: Washington, D. C. CODEN: 69CKQP
DOCUMENT TYPE: Conference; Meeting Abstract
LANGUAGE: English

AB We describe a stacked and strongly tighten multiple plates' reactor as well as the manner to use it for exothermic reactions, such as the **Fischer-Tropsch** (FT) **synthesis** of **hydrocarbons** or water-shift of **Carbon Monoxide** into **Hydrogen**. Thin catalyst grains fill the relatively narrow and short channels of the "reactive" plates (R) made of a well heat conducting metal. A **coolant** fluid crosses other neighboring metallic plates, called heat-conducting (H) plates of a similar shape and size. The H plates are strongly tightened of the two sides of every R plate to insure a very good thermal contact between them. Dozens or hundreds of such R and H plates can be assembled in a sandwich structure supporting quite high-pressure syntheses or conversions. Very active, fine-granule catalysts used in such enhanced **heat-exchange** configuration enable us to considerably reduce the size of the whole reactor. In addition, the reactor can be easily assembled and disassembled. This allows easy transport to the sites where relatively limited resources of waste hydrocarbon gas, an associated gas, a biogas, etc. Can be converted to **synthesis gas** (a mixture of CO and H2) and then to synthetic ultra-clean liquid fuels or Hydrogen. Moreover, in the case of FT process, the activation of the catalyst (a very important and delicate operation) can take place inside the same R plates, for example in the catalyst factory, so that ready-to-use R plates are shipped to the final user who can proceed a simply standard exchange of whole R plates, sending the used plates for regeneration.

L8 ANSWER 5 OF 7 CAPLUS COPYRIGHT 2004 ACS on STN
ACCESSION NUMBER: 2001:472605 CAPLUS
DOCUMENT NUMBER: 135:79010
TITLE: Hydrogen and elemental carbon production from natural gas and other hydrocarbons
INVENTOR(S): Detering, Brent A.; Kong, Peter C.
PATENT ASSIGNEE(S): Bechtel BWXT Idaho, LLC, USA
SOURCE: PCT Int. Appl., 67 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2001046067	A1	20010628	WO 2000-US33114	20001206
W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
US 6395197	B1	20020528	US 2000-732451	20001206
US 2002151604	A1	20021017	US 2002-109427	20020327
PRIORITY APPLN. INFO.:			US 1999-172976P	P 19991221

US 2000-732451 A3 20001206

AB A method for converting one or more hydrocarbon reactants to diat. hydrogen and ultrafine elemental carbon particles in a fast quench reactor. In said quench reactor, the hydrocarbon reactants are thermally decomposed by plasma in an axial reactor chamber to an intermediate product stream comprising diat. hydrogen and unsatd. hydrocarbons. As the intermediate product stream exits the axial reactor chamber through converging-diverging nozzle the intermediate product stream is cooled down, in convergent nozzle portion, to prevent back reactions and then heated up, in divergent nozzle portion, to further decompose the unsatd. hydrocarbons to form more diat. hydrogen along with elemental carbon. **Coolant** gases may be added at different stages in the process to form a desired end product and prevent back reactions. The product is a substantially clean-burning hydrogen fuel that leaves no greenhouse gas emissions, and elemental carbon that may be used in powder form as a commodity for several processes.

REFERENCE COUNT: 9 THERE ARE 9 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 6 OF 7 CAPLUS COPYRIGHT 2004 ACS on STN
ACCESSION NUMBER: 1954:30502 CAPLUS
DOCUMENT NUMBER: 48:30502
ORIGINAL REFERENCE NO.: 48:5469b-c
TITLE: Producing **hydrogen** and **carbon monoxide** from gaseous hydrocarbons
INVENTOR(S): Martin, Homer Z.; Hemminger, Charles E.
PATENT ASSIGNEE(S): Standard Oil Development Co.
DOCUMENT TYPE: Patent
LANGUAGE: Unavailable
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2665199		19540105	US	

AB In the presence of a metal oxide steam is introduced with O in the oxidation of CH4 to H, CO, and CO2 to increase the ratio of H to CO and improve the yield of **synthesis gas** for the **Fischer-Tropsch** process. With an Fe oxide catalyst (I) at 1600-1800°F. and a pressure of 100 lb./sq. in., CH4 1.0, H2O 0.73, and O 0.55 mole are converted to H 1.957, CO 0.738, CO2 0.212, and CH4 0.05 mole. The charge gases are preheated to 800-1000°F. by **heat exchange** with the products, and the reaction is carried out in a **fluidized bed** of I.

L8 ANSWER 7 OF 7 CAPLUS COPYRIGHT 2004 ACS on STN
ACCESSION NUMBER: 1952:24836 CAPLUS
DOCUMENT NUMBER: 46:24836
ORIGINAL REFERENCE NO.: 46:4203d-e
TITLE: Gasification of carbonaceous solids
INVENTOR(S): Reichl, Eric H.; Safford, Robert V.
PATENT ASSIGNEE(S): Pittsburgh Consolidation Coal Co.
DOCUMENT TYPE: Patent
LANGUAGE: Unavailable
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
GB 658542		19511010	GB	

AB A method is described for the complete gasification of carbonaceous solids to yield a H-CO mixture suitable for use as **synthesis gas** in the **Fischer-Tropsch** process. In the 1st stage, pressurized steam from the product-gas **heat exchanger**

is used to fluidize a bed of low-temperature coke. This bed is maintained at 1400-1800°F. by partially burning in a combustion zone a portion of the coke with air, also preheated by **heat exchange**. The unburnt coke is removed from the flue gas by an internal cyclone and is returned to the **fluidized bed**. In the 2nd stage, the heated coke is further raised in temperature by partially burning with O in a powdered fuel burner and is finally gasified with the heated steam from the fluidizer. The temperature of the burner is maintained at 1900-2500°F. for the non-slagging operation and 2500-3000°F. for slagging.

WEST Search History

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☐	L10	l5 and internal cooling	0
☐	L9	L8 and heat near1 exchang$2 with immers$2 with fluidized bed	0
☐	L8	l5 and fluidized bed	119
☐	L7	L5 and coolant with boiling point with below near4 temperature	1
☐	L6	L5 and coolant with pressure near5 reaction	1
☐	L5	L4 and temperature with boiling point	146
☐	L4	L3 and coolant	258
☐	L3	L2 and heat near1 exchang$2	1193
☐	L2	L1 and (Fischer near1 tropsch or hydrocarbon$1 near1 synthesis)	3944
☐	L1	Synthesis gas or (hydrogen near1 carbon monoxide)	24192

END OF SEARCH HISTORY